Preschool Enrichment and Learning[1]

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This paper discusses some of the basic cognitive units and processes involved in intellective functioning. It suggests that the basic units consist of schemata, images, symbols, concepts, and rules and that motor action does not have to be an accompaniment to the acquisition of some of these cognitive structures. Comprehension, memory, generation of solution hypotheses, evaluation, and implementation are offered as the basic cognitive processes and some suggestions are made that may be helpful to the teacher. It is argued that the concept of intelligence has no explanatory meaning and that the components that are selected to characterize the intelligent child will change over culture and history. It is urged that communities and educators adopt a relativistic attitude toward the familial or educational experiences that promote optimal growth, for it is not possible to specify the correct set of experiences unless one simultaneously notes the cultural demands the child will encounter.

L'auteur traite de certains procédés cognitifs de base qui font partie de la fonction intellectuelle. Il suggère que les structures de base consistent en schémas, images, symboles, concepts, et règles et que l'action motrice n'est pas nécessaire à l'acquisition de certains de ces structures cognitives. L'auteur considère la compréhension, la mémoire, les hypothèses de solution, l'évaluation, et l'exécution comme les procédés cognitifs de base; il offre quelques suggestions qui peuvent aider l'instituteur. L'auteur affirme que le concept de l'intelligence n'a pas de sens explicatif et que les traits qu'on choisit pour caractériser l'enfant intelligent changeront selon la culture et l'histoire. L'auteur propose que les communautés et les éducateurs adoptent une attitude relativiste envers les expériences familiales ou éducatives qui promeuvent le développement optimal, car il est impossible de préciser les expériences correctes à moins qu'on ne note en même temps les exigences culturelles que l'enfant rencontrera.

Americans have become preoccupied with early intellectual development because of a fundamental assumption that our racial and ethnic problems will not be solved as long as there are enormous differences in the style of cognitive functioning among our school-age children. But since it is not clear how we should describe or conceptualize early cognitive development there is little agreement among educators and psychologists on strategies for change or intervention. The present paper addresses itself to these fundamental issues in the hope that it will inform practical, social-action plans.

The popular interpretation of the unfortunate fact that poor children find school difficult is that early experiences in the family, rather than demons, floating wombs, or excessive secretion of body humors, are the villainous cause of unsatisfactory academic achievement. It is possible that we, like the Greek and medieval physicians, have an exaggerated faith in the validity of our diagnosis. For it is unlikely that interactions with parents are the sole determinant of the complete sweep of psychological development. However it is probably safe to assume some truth to the idea that the child's experiences with adults during his first five or six years have a nontrivial influence on his future abilities and motivation. Since an increasing number of educated women want careers outside the home, and many poor women work in order to contribute to the economic stability of their families, our society has been nudged to create sources of supplementary care outside the home, and pushed to the lip of a major structural alteration in the form of child care. It is likely that we will soon have several million children under age six cared for outside the home by adults who, in most instances, are complete strangers to the parents. Since there is no firm body of data or theory that allows us to predict the consequences of this arrangement we should worry a little about its possible sequelae. Hence, the question of what to do with young children is relevant whether the location of child care be the home, a neighbor's apartment, a trailer, or a freshly built day-care center on a busy city street. How do we arrange the environment so that the child's growth is optimal?

Let me state a prejudice in the clearest form possible. *One cannot prescribe the correct experiences for a child unless one specifies the environment to which he must adapt.* The skills, strategies, beliefs, and motives that are useful in one environment may be

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irrelevant or, in some instances, debilitating in another. We allow our children to express their anger because we believe that suppression of this emotion will produce an overly inhibited and tense child, and that an excessively inhibited adolescent will not fare well in our competitive society. The Eskimo, by contrast, try to prevent expression of anger in older children because they believe it will destroy the close feelings of cooperation that must be maintained if one lives continually with six others in an area of 1000 square feet. Unfortunately most citizens prefer to assume a more absolute posture, believing in a fixed and special set of psychological attributes that permits an adult to be happy and successful, and a parallel set of environmental experiences that allows that psychological house to be built. This is much too simple a view. There are too many different profiles of successful psychological adjustment to ensure the truth of the first proposition, and too many local theories of child-rearing to bolster the second. The rural, poor mother in West Virginia believes that a slap on the bottom will teach her child to inhibit childish crying or teasing of a younger sibling. The middle-class Princeton mother is sure that deprivation of a privilege will accomplish the same goals. The Utku mother living northwest of Hudson Bay knows that there is nothing she can do until the child is old enough to understand that whining and teasing are wrong, until the child acquires what the Utku call *ihuma*, which is best translated as *reason*. And we should not be surprised that most seven-year-olds in all three cultural settings have stopped both of these undesirable behaviors. There are many ways to socialize a child, and a relativistic attitude toward psychological growth is the only rational attitude to promote. There is no recipe of caretaking practices that accomplishes some ideal set of goals independent of the cultural context in which the socialization proceeds. There is no wrinkled guru who possesses the universal "how-to-do-it" secrets of human development. Despite the intellectual attractiveness of this conclusion, our hearts boldly resist it and persuade us that some experiences must be more beneficial to growth than others, and we continue to search for a statement that summarizes them. Although there is no neat recipe for growth, it is true, nevertheless, that there are some basic assumptions about psychological development and this paper considers some of these ideas. Although this essay is primarily on cognition it is useful to distinguish among the three great psychological systems of *behavior*, *cognition*, and *motivation*.

The domain of overt public behavior is most easily specified. The child's repertoire of public actions is best described by its functions. Some responses are used to gratify biological needs. Others are used for defense—physical as well as psychological. Still others are employed to gratify learned desires and further psychological growth. Some behavioral systems, like the motor coordination necessary for walking or playing tennis, are acquired through the processes of conditioning. Other response systems—like language—are potentiated through mere exposure to the proper set of environmental events. The child's speech emerges naturally, though mysteriously, as a result of listening to a talking environment. Apparently structures in the temporal lobe have been specially prepared by nature for the reception and organization of language. Given the raw material provided by hearing people talk, these brain structures manufacture language products in their host. Still other behavioral systems are acquired through observation of others, followed by imitated practice. Learning how to open a window is perhaps the straightest example of this last category. Thus our first assumption is that if one prefers to use the word *learning* to cover all these types of *change*, it is appropriate to speak of different modes of learning.

Cognition—or more simply thought—is our second system, where cognition is assumed to refer to a set of mental units and a coordinated set of processes that manipulates these units in the intricate ballet of thought. The primary functions of cognition are (1) to allow the child to recognize the past, (2) to understand new experience, and (3) to manipulate his symbols, concepts, and rules in order to solve a problem. The basic units of cognition include schemata, images, symbols, concepts, and rules. The basic processes include perception, memory, inference, evaluation, and deduction, organized by special executive processes that are responsible for the permanent registration of experience, as well as its transformation and activation when problems have to be solved. Although we return to a discussion of the five units and five processes later, it is useful to explain now this last idea of the executive, since it has only recently attracted the attention of psychologists.

All children learn a language to label discrete

aspects of their experience. These linguistic structures are placed in long-term memory and retrieved, as if by a special mental rake, by an executive process that organizes knowledge as it retrieves it, much as a construction foreman directs the depositing of bricks, boards, and pipes around the building site and, at the proper time, retrieves them from the correct location and organizes them into the proper architectural form. There are important differences among children in the efficiency with which this executive operates.

Consider the following empirical finding. Four-year-old and eight-year-old children are shown a row of six familiar objects—a pin, button, cup, fork, doll, and scissors. The examiner assures himself that each child can name each of the six objects correctly. Now the examiner touches four of the six objects once in a random order, perhaps button, fork, doll, and scissors, and then asks the child to touch the objects in the same order. The four-year-old performs poorly, the eight-year-old does very well. We know that the younger child's failure does not result from absence of a language label for each of these simple objects. We also know that a four-year-old is capable of remembering much more information than is required in this problem. For if he is asked to examine 60 pictures from magazines, for about two seconds each, and is then shown 120 pictures, 60 of which are new and 60 of which he looked at earlier, and asked simply to say which ones he saw, he is correct 90% to 100% of the time. Some children make no mistakes when tested two days later. The four-year-old can remember 48 hours later that he saw 60 pictures, if all he has to say is "yes" or "no," "old" or "new." But he cannot reconstruct a temporal pattern of only four events. Our explanation of this apparent paradox is that the young child did not activate the language label that he had in his repertoire while the adult was touching the objects. He did not use his knowledge to help him remember the temporal pattern he watched. Proof of this conclusion comes from a study in which five-year-olds, eight-year-olds, and adults looked through the 60 pictures under two different conditions. One group was given no special instruction, as in the experiment cited above. The second group was told to label the picture in some way. Then all the subjects were shown 120 pictures—60 old and 60 new—and asked to say which ones they saw earlier. For adults, who naturally activate a conceptual set of labels for experience, it did not make much difference which group they were in. They performed well under both instructions. However, for the children, especially the five-year-olds, those who were instructed to label benefited enormously and their performance was much better than those five-year-olds who examined the pictures under no special instruction, and who apparently did not activate any label for the pictures.

A second example comes from the Kpelle of Liberia, who do not have a written language. A list of words was read to the Kpelle adult, some of which belonged to one conceptual category, like weapons, and some to another conceptual category, say edible foods. The subject was asked to remember these words and to recall them when the complete list had been read. The subject remembered about as many words as an American adult on the very first reading. But with succeeding readings of the list, Americans improved dramatically, while Kpelle did not. It appears that the Kpelle did not have the mental set or disposition to organize the "weapon" words into one conceptual category and the food words into another, even though they had the individual words for the category. However, the more education a Kpelle had, the more his performance resembled that of an American. Education teaches the use of categories. The executive strategy of organizing experience into conceptual categories is one of the functions strengthened by formal education. We must make a sharp differentiation, therefore, between possessed knowledge and the active use and organized retrieval of that knowledge to solve a problem.

Consider a final example of the executive process from the infant. Ten-month-old infants were allowed to play with a simple toy—say a toy animal—for a few minutes. Then six minutes later they were given a pair of toys, a new one and the one they had played with earlier. Some children went directly to the new toy. Others first visually scanned each of the two toys two to three times, and only then crawled to the new one. We do not believe that it is a coincidence that the infants who stopped to scan both toys had mothers who were more interactive and playful with them. This one-to-one interactive activity between caretaker and infant may facilitate the development of this executive process that compares the past and present and retrieves relevant knowledge in time of conceptual conflict. The closely tuned interaction, we believe, sets the baby to look for variations

on an habituated theme. The child comes to expect "surprises" and becomes increasingly skilled at assimilating them. In short, we believe that one-to-one interactive play that is closely monitored by the adult and is, therefore, assimilable by the child sculpts a process that disposes the infant to compare "what is happening" to "what just happened," and to attempt to understand it. To be concrete, we are suggesting that a child who is exposed to games like "peek-a-boo" between caretaker and infant gradually develops an expectation of moderate surprises, becomes vigilant to those variations in the external environment, derives pleasure from that understanding, and, as a result, becomes increasingly alert for information in the external world and more strongly motivated to interpret it.

The third major system—after behavior and cognition—refers to motives in the broadest sense, and includes the varied goals the child desires to attain, his expectancy of obtaining them, and the affect that occasionally accompanies motivation.

If these are the three systems that form the bedrock of psychological development, we can ask about their relation to the title of this paper. The phrase preschool enrichment usually means providing experiences that will make poor children from ethnic minority groups similar to middle-class white children in behavior, cognition, and motivation. A more relativistic definition of enrichment would be concerned with how one arranges the environment so that the largest number of children eventually come to possess the behaviors, cognitive structures, and motives that will be most adaptive for their particular cultural setting. To illustrate, black English frequently omits syntactic forms of the verb to be. Thus, "I goes home" means the same as "I am going home." The former sentence is different from standard middle-class English, but it is not necessarily a cognitively deficient sentence. Hence the primary issue surrounding "what should be enriched" is as much an ethical as it is a scientific issue. The members of any society must decide on the profile of psychological qualities to promote, and a pluralistic attitude toward the goals of growth should be considered. But whether one route or many is selected, the issue of deciding goals cannot be ignored. Families and educators must make a value choice. It is suggested that parents and teachers cooperate in the elucidation of educational goals and in their implementation. This arrangement not only guarantees a commitment on the part of the family to the goals of the school of the preschool center, it also facilitates mutual identification on the part of all parties. Such an affective involvement with the child's growth can be only beneficial.

Each social community has an implicit catechism of ideal traits for its children. I suggest that most, but not all, Americans would support the following statement of developmental goals—a sort of psychological platform for children. Each child should believe he is valued by the adults who care for him so that he will develop an autonomous identity, be self-reliant, and come to believe he can determine his own actions and values. We should note that these simple premises are not shared by all societies. The Japanese, for example, reject our stress on individual identity and self-reliance and are convinced that an adolescent should not be completely self-determining. He should be ready and willing to rely on others for help and affective support. Americans, by contrast, generally regard such behavior in a late adolescent as immature and excessively childish. Each of us is a unique bundle of talents and temperaments with a best fit in some particular context. My profile happens to be in harmony with the community in which I live, and thus there are occasional moments of serenity. But I can imagine a half-dozen environments in which I would be miserable.

Each parent, parent surrogate, and educator must toss a prophetic fishline forward in time and estimate the talents, motives, and beliefs that will be most useful for 1990. Fortunately the set of traits to celebrate cannot be totally unrelated to those we promote now for there are sociological constraints on the amount of social change that will occur, as well as biological limits on man's psychological elasticity and imaginative capacity to invent a totally novel set of goals. It is reasonable to expect, therefore, that as far as cognitive processes are concerned, we shall continue to value the child who has a rich store of concepts and rules, and effective strategies for registration of experience and retrieval of knowledge. The more specific talents that fill out that abstract formula will probably include reading competence (despite McLuhan, since reading is so much more efficient than listening), quantitative skills, the ability to write coherently, and the capacity to discriminate effective from ineffective arguments. The required motivational processes will include, at a minimum, the wish to be intellectually

competent, an expectancy of obtaining that goal, and a firm personal identity.

As promised earlier, we now consider in more detail the cognitive and motivational processes that make development appear progressive.

First, we consider the cognitive structures that should be enhanced at home and in preschool educational centers.

The basic units in cognition consist of schemata, images, symbols, concepts, and rules.

Schemata. The schema, which is the infant's first acquired cognitive unit, is a representation of the salient aspects of an event. Although the schema is neither an image nor a photographic copy of the event, it does preserve the arrangement of the significant elements that define the event. Your schema of Atlantic City is likely to contain water as a critical element. The critical elements of a schema give it distinctiveness and, like the cartoonist's caricature, exaggerate the most salient attributes of the event.

During infancy the salient elements can include the sensory feedback from the infant's actions toward an object. Thus, a baby can represent, or come to know, his favorite rattle in terms of its visual appearance as well as through his actions toward it. Piaget believes that sensorimotor action with objects during the first year of life is necessary for cognitive growth, and he talks of the acquisition of sensorimotor schemes.

Most enrichment programs for infants—as well as toy departments—emphasize play with attractive toys. The single most common element in all day-care programs for infants in the United States is the presence of toys that permit the infant to shake, rattle, push, and pull them and receive feedback from this manipulation. It is assumed that these experiences help to teach the child about the object and, as a dividend, persuade him that he can have an instrumental effect on the world. Although this notion seems intuitively reasonable, it is not so obvious to all parents and professionals. Some Dutch physicians in the eastern part of Holland instruct the mother to minimize the amount of stimulation and play that the infant experience during the first 10 months of life, and they lie alone in cribs, with no toys, for the first 40 weeks. And these children are intellectually adequate at age five, although they are a little retarded on American tests of intelligence at one year. Moreover, limbless infants born to mothers who had taken thalidomide have no opportunity to manipulate toys, yet their cognitive development seems perfectly adequate. Thus, despite the intuitive reasonableness of the idea that play with toys should be necessary for mental development, the empirical data force us to at least question the strong form of that proposition.

Perhaps the most compelling argument for this idea is that the child acquires knowledge of language merely by listening to other people speak. The child does not have to speak, even though normal children do, in order to learn some of the complex knowledge represented by the meaning of language signs and the rules of syntax. This is also true for the learning of song among birds, for the young chaffinch can learn to sing the song of its species merely by listening to that song on tape. It does not have to make any sounds while it is exposed to those important auditory inputs. Although motor action probably facilitates cognitive development because it keeps arousal high and provides important feedback information, it can still be true that overt behavior may not be necessary for the acquisition of some cognitive structures.

Images. A schema is not synonymous with a visual image, for the child can have schemata for voices, odors, and textures. The image is a mental picture and is a special and more elaborate structure that is related to the schema and more easily manipulated. However, like the schema, it preserves the unique pattern of physical qualities in the event. Perhaps the best way to regard the relation between schema and image is to view the former as the basic skeleton from which the more detailed holistic image is built. A schema is used in the construction of the image when cognitive processes perform work on it.

Symbols. Symbols are qualitatively different from both schemata and images, for unlike the latter two, a symbol is an *arbitrary representation* of an event. The best example is the name for a letter, a number, or an animal. A child who can name the arbitrary collection of lines we designate as the letter M and can point to an M when asked possesses the symbol for that alphabetic letter. In most children, symbolic function begins around 15-18 months, but can begin as early as one year. Most enrichment programs encourage the development of symbols, especially linguistic symbols, by encouraging the caretaker to begin to

name objects in the child's environment as soon as the teacher feels the child can understand them.

Concepts. All concepts are symbols but they are much more than that. A concept stands for a set of common characteristics among a group of schemata, images, or symbols, and is not a specific object. A concept is a representation of a feature or features common to a variety of experiences. Consider the drawing of a cross. The eight-month-old infant possibly represents the cross as a schema. The three-year-old, who may call it a cross, represents it as a symbol. The adolescent who regards it as the cross of Christianity and imposes on it a relation to religion and church possesses the concept.

One of the serious difficulties preschool children have is that they regard many concepts as absolute, rather than relative. When the four-year-old first learns the concept dark, he regards it as descriptive of an absolute class of color—black and related dark hues. The phrase "dark yellow" makes no sense to him, for dark signifies dark colors, not relative darkness.

It is important that the child appreciate both the absolute and relative qualities of many concepts, and to persuade him that the same concept can have several different meanings in different contexts. The set to appreciate the relativity of conceptual dimensions can be promoted by a number of game-like problems in which the child has to name the multiple attributes of objects. A banana is yellow and brown and long and soft and smooth and sweet and sticky. A rock is good for breaking glass but bad for bouncing. A glass is good for drinking, fair for making musical melodies, and absolutely useless for drawing. The child himself is many things: he is a boy, the son of his father, the smallest child in the family, but the largest child in his classroom. It is possible to help the young child appreciate the multidimensional quality of concepts, and this victory seems to facilitate other intellectual conquests.

Rules. There are two kinds of rules. One states a relation between two concepts. The rule "water is wet" states that the concepts water and wet are related, for one of the dimensions of water is the quality wetness. A second type of rule is a mental operation or routine imposed on two or more concepts to produce a new one. Multiplication is a rule imposed on two numbers to produce a third. We call these rules transformations. Piaget claims that there are discrete stages in the acquisition of rules. The appearance of stages in the child's thought sometimes results from the fact that rules that are learned initially stubbornly resist retirement, for they have been so effective in the past. A child's rule, like a scientific theory, is never replaced by criticism alone, only by a better rule.

Having considered the basic units of schema, image, symbol, concept, and rule, we turn now to the cognitive processes that manipulate these units in thought. Cognitive processes include two general types, undirected and directed. Undirected thinking refers to the free flow of thoughts that occurs continually as the child walks home or stares out the window. Directed thinking, by sharp contrast, refers to the processes that occur when the child tries to solve a problem. He knows there is a solution and he knows when he has arrived at it. This problem-solving process typically involves the following sequence: comprehension of the problem, memory, generation of possible solutions, evaluation, and implementation.

Comprehension of the problem. Understanding the problem, which must be the first event in problem-solving, requires selective attention to the salient aspects of an event and organized interpretation of information. Most problems are presented in the verbal mode and, therefore, the richer the child's vocabulary—that is, his language concepts—the more successful his understanding. This is one reason why the majority of preschool programs emphasize the teaching of words. However, all concepts are not linguistic, and if the child becomes overly accustomed to using only language to understand a problem, he may fail to develop other strategies. Hence, problems and information must be presented in nonverbal modes, including pictures, sounds, and action.

The preschool child has difficulty focusing attention on more than one event at a time. If he tries to listen or watch many things at once he often becomes confused. Hence, the teacher should guarantee that she has the child's attention when talking to him. The best way to accomplish this goal is to have an adult working 1:1 or with only a small group of children. Since it is impossible to have a half-dozen licensed teachers in every preschool center, paraprofessionals must be used. Mothers, older children,

and college and high school students are an excellent reservoir of needed talent and help.

Memory. Memory refers to the storage of experience. There are two major kinds of memory, short term and long term. This differentiation is based, in part, on special structures in the central nervous system that seem necessary for long-term memory. Information in short-term memory is typically available for 15 to 30 seconds. The easy forgetting of a new telephone number after it has been dialed is the best example. Unless one makes a special effort to transfer the perceived information to long-term memory, some or all of it will be lost. Young children display poor memory because (1) they have a less adequate set of cognitive units to encode information for placement in long-term memory, (2) they have not learned the trick of rehearsal and do not spontaneously repeat events to themselves in order to aid transfer to long-term memory, and (3) they are not efficient at retrieving what they know. Enrichment programs should include exercises in which the child is taught memory tricks, ways of grouping words, numbers, or pictures and strategies of free associating that will aid later recall. Moreover, anxiety is memory's major enemy; it interferes with focused attention and with the ability to recall the past. Curricula should help the child develop strategies for placing new knowledge in memory and for efficient retrieval, while keeping distraction and anxiety tamed.

Generation of ideas. The comprehension of a problem and remembering it are typically the first two processes in any problem-solving sequence. The third process is the generation of possible solutions, the thinking up of alternative ways to solve the problem. The child is motivated to seek solutions whenever he comes across a problem he does not understand, one for which he does not have an immediate answer. The child sees his mother weeping or watches a bird unable to fly. These events create a state of uncertainty because he cannot explain the event. He wants to resolve this uncertainty, to understand the experience, and so he dips into his reservoir of knowledge and searches for ideas that will allow him to explain what he has seen. One of the major obstacles to the generation of good ideas is the possession of beliefs that conflict with good solutions. A set of firmly held ideas that are inconsistent with the required solution is one cause of rejection of the correct idea, should it occur. Anxiety over possible criticism for suggesting unusual ideas also can be inhibiting, for fear typically blocks creative solutions. The easiest and most common reaction to fear of error is to withdraw from the task or, if the fear is mild, to inhibit offering answers. Every preschool teacher recognizes this syndrome, for each group has a few children who are intelligent, but overly inhibited. They know more than they are saying, and censor good ideas because they would rather avoid making a mistake than risk the joy of success. The teacher must reduce these fears by encouraging guessing and convincing the child that honest approximations are better than no response, any attempt better than none.

Evaluation. Evaluation refers to the degree to which the child pauses to evaluate the quality of his thinking and the accuracy of his conclusions. This process influences the entire spectrum of thought, including the accuracy of perception, memory, and reasoning. Some children accept and report the first hypothesis they produce and act upon it with only the barest consideration for its quality. If correct, they are called ebullient; if not, unruly. These children are best called impulsive. Others devote a long period of time to considering their ideas and censor many hypotheses. These children are reflective. If correct, they are called wise; if incorrect, dull. This difference among children can be seen as early as two years of age and seems to be moderately stable over time. Fortunately, the child's disposition to be reflective or impulsive can be modified by training.

The impulsive child can be made more reflective by direct instruction (Kagan, Pearson, & Welch, 1966), by reinforcement for a reflective posture (Briggs, 1966; Nelson, 1968), or by modeling procedures (Debus, 1968). It is even possible to move an impulsive first grade child toward a reflective attitude by placing him in a classroom with a reflective teacher (Yando & Kagan, 1968). Educators should consider this information in working with young children.

Implementation of ideas—the deductive phase. Deduction or implementation is the application of a transformational rule to solve a problem, once the solution hypothesis has been generated. There are basic changes in the child's understanding and use of rules during

his first 12 to 15 years. Some psychologists assume the child merely learns more good rules each day, storing them for future use, and there is no rule that is necessarily too difficult for a child to comprehend and apply. The alternative view, which I find a little more friendly, is that some rules are inherently too complex for young children to understand. Hence there must be maturational stages in the development of thought.

Let us summarize this section on cognition by noting the general changes that occur during the period from one through six years of age. The richness of the child's supply of symbols, concepts, and rules increases each year and these units undergo continual reorganization as a function of experience, especially experience that causes him to question what he knows.

The original function of thought is to help the child make sense of his experiences. If he witnesses an unusual event he does not instantly understand, he reaches back into his mind to pull out an explanation that will put him at ease again. The child becomes increasingly concerned with the amount of agreement between his concepts and those of others, and he becomes more apprehensive about making mistakes. Hence his conception of problems and the rules he activates to solve them begin to approach that of the adult community. The second function of cognition is to communicate thoughts and wishes to others. Finally, thought permits the pleasure that comes from having a good idea, which is one of the basic sources of joy nature has permitted us. You will note that I have refrained from using the word *intelligence* or *IQ*. This was a purposeful act for I believe we should think of mental phenomena as a set of coordinated, but seperate processes—not as a global capacity. Let me defend this prejudice.

The concept of intelligence. Human beings like to rank order people and things into categories of good, better, best. We are not satisfied with noting that the rose is a deep red but feel pressed to add that it is the loveliest flower in the garden. Man automatically gives a goodness-badness score to most of his experiences. He also performs this evaluation on himself: for homeliness is bad and attractiveness good, weakness bad and strength good. Of the many attributes of man, three typically receive special attention in all cultures.We usually evaluate physical qualities, inner feelings, and skills. There are very few cultures known to man that do not have special words to describe how a person looks, how he feels, and how competent he is—and these words imply that certain appearances, feelings, and skills are good, while others are bad.

But each culture's decision is somewhat arbitrary and may not be valid for another group or for its own membership at another time in history. In 17th century Europe, women whom we in America today would regard as hopelessly overweight and unattractive were viewed as beautiful and a comparison of a Rubens' nude with that of a Gauguin reveals the changing standard of attractiveness.

The skills that are tagged good or bad also vary with time and social group, although every society sets up certain talents as most desirable. Bushmen must be skilled at hunting and tracking and those who possess these talents are given a designation that has a connotation similar to our word intelligent. Intelligent is the word society uses to apply to those people who possess the mental talents the society regards as important. But those talents change with time. In the late 19th century Francis Galton suggested that those with extremely sensitive vision and hearing were intelligent because the dominant brain theory of the day emphasized the importance of transmission of outside sensory information to the central nervous system. Today we emphasize the salience of language and reasoning because our theories of the brain have changed. But, like Galton, we still use the word intelligent to designate those who have more of those skills we happen to believe are "better."

From a scientific point of view we should exorcise words like intelligent because they are primarily evaluative and explain very little. But this exorcism will not happen because most members of our society —scientists as well as nonscientists—believe that this word has an explanatory power that derives from differences in our brains. So let us consider possible meanings of this word.

There are at least four different meanings of the concept of intelligence that deserve mention. The first is not very psychological; the remaining three are, but are different in conception.

1. Intelligence as adaptation to the environment: The ability to adapt to the specific environmental niche in which an organism lives and grows is, for the biologist, the most important attribute of an

animal species. Successful adaptation requires resisting predators, maintaining a capacity to reproduce the next generation, and having the capacity to cope with new environmental pressures by learning new habits and changing one's anatomy and physiology. Evolutionary history tells us that some species, like the opossum, have survived for many thousands of generations, whereas others, like the graceful heron, are about to become extinct. If intelligence is defined as the ability to adapt to an ecological niche, then the opossum must be more intelligent than the heron. Since this conclusion contradicts our intuitions, this view of intelligence has never become popular. But that attitude is a matter of taste, not logic.

2. Piaget's view of intelligence: Piaget believes that intelligence is the coordination of mental operations that facilitate adaptation to the environment. Hence, in one sense, Piaget promotes the biological prejudice described above. The growth of intelligence is the resolution of the tension between using old ideas for new problems and changing old ideas to solve new problems. Intellectual growth is adaptation to the new through alteration of old strategies, and the intelligent child is the one who has the operations that allow him to solve new problems.

3. The ease of learning new structures and skills: The most popular layman's view of the concept of intelligence assumes that the more intelligent the child the faster he will be able to learn a new idea or skill. This belief rests on the notion that there is a generalized receptivity to acquiring new competences, regardless of their specific nature. This faith is opposed by the belief that there are important differences depending on what specific skill is being learned. The man who learns a foreign language quickly may not have such an easy time learning to sail. This tension between a generalized intelligence and a set of specific intelligences is the subject of much controversy among psychologists and is reflected in our ambivalent attitude toward experts. We announce preference for the doctrine of specific intelligences by surrounding the President of the United States with counselors of different expertise—economists, social scientists, physicists—assuming that insight into inflation is most likely to come from the person who has gained knowledge in economics. As citizens we tend to seek advice from varied people according to the problem. We ask for help with our fears from a psychiatrist, help with our investments from a broker, and advice on building a house from an architect. However, there are still lingering beliefs in a generalized intelligence, for the society is still willing to listen to the advice of a Nobel laureate in physics on how to solve the racial crisis in our schools, as if brilliance of insight into atomic structure indicated profound understanding of social psychological problems. It is this issue that captures the intense controversy surrounding the current use of intelligence and the value of the IQ score. Parents and teachers who believe that intelligence reflects the capacity to learn new skills with ease are often impressed with the intelligence test because the IQ score of a 10-year-old does predict, to some degree, his grades in high school and college. Is this possible because there is a general ability to learn that is stable over time and domain? Or is it possible because the skills that are taught in most high schools and college are intimately related to the skills measured on the intelligence test? The ability of the IQ obtained at age 10 to predict high school English grades may merely reflect a specific intelligence. In this case, it is the capacity to master English concepts and vocabulary. One reason why this last conclusion is attractive is that there is no question on the standard IQ test that requires the child to learn any new concept, idea, or skill.

4. The IQ test: The notion that the IQ score defines intelligence is much different from the three conceptions considered above. Unfortunately, it has gained wide acceptance by Americans. The typical American parent is anxious about his child's IQ and attributes more value and mystique to it than to most characteristics his child possesses. Many believe that a person's IQ score is inherited, does not change very much over the course of a life, and can be measured in early infancy. These beliefs are gross exaggerations of the truth. Although most people regard intelligence as the ability to learn a new skill as a result of experience, the majority of questions on intelligence tests do not require any new learning, but ask the child whether he knows a particular segment of knowledge. Hence the IQ test does not measure the central attribute that most people believe defines intelligence.

However, the intelligence test is an excellent measure of how much the child has learned about the dominant concepts in his culture. That is why the IQ score is a good predictor of school grades.

Since middle-class children are more consistently

encouraged than are lower-class children to learn to read, spell, add, and write, rather than to keep away from police or defend oneself from peers, the child's IQ, social class, and school grades are all positively related. The IQ is an efficient way to summarize the degree to which a child has learned the vocabulary, beliefs, and rules of middle-class American society. The IQ is extremely useful because it can predict how easily a child of 8 years will master the elements of calculus or history when he enters college. However, the specific questions asked on intelligence tests have been chosen deliberately to make this prediction possible. The child is asked to define the word "shilling" rather than the word "rap"; he is asked to state the similarity between a "fly" and a "tree," rather than the similarity between "fuzz" and "Uncle Tom"; he is asked what he should do if he lost one of his friend's toys, rather than what he should do if he were attacked by three bullies. IQ tests are not to be discarded merely because they are biased toward measuring knowledge that middle-class white Americans value and promote. But both parents and teacher should appreciate the arbitrary content of the test. It is not unreasonable that if the printed word becomes subordinate to tape recorders and television as ways to present knowledge, 100 years from now our culture —in the same way as the early Greek orators—might place higher value on the ability to imagine a visual scene than on richness of vocabularly. We may have a different test of intelligence a century hence because the skills necessary to adapt successfully will have changed. Perhaps the groups we call intelligent at that time will be different from those who have that label today.

We can only hope that public preschool centers will acknowledge that quality of intellect is relative to the demands of the culture and that these centers will promote pluralism in curricular content and educational goals. As indicated earlier, one way to protect against uniformity of philosophy is to have parents actively involved in the educational planning.

It will always be true that some people will be better adapted to the society in which they live than others, and man is likely to attribute their more successful adaptation to the possession of a set of special talents. The society will then make a test to measure these talents and label the score as an index of "intelligence." This process is bound to continue as long as man continues to evaluate himself and others. What will change is the list of talents he selects to celebrate.

Motivation. Let us, in the final pages, examine briefly the two problems surrounding the relation between motivation and the issue of enrichment. The pivotal assumption can be stated plainly. *Too many poor children in our country enter school with minimal motivation to master school tasks and no expectancy of succeeding.* Since the school directs its tutoring procedures toward the average child, the second grader who has not learned to read or write is hopelessly behind four years later. Perhaps 5% to 7% of these children, but probably no more, have subtle nervous-system pathology that is undiagnosed, and normal curricular procedures may have less startling success with these children than with normal ones. But the vast majority of children who fail to show satisfactory progress in school do so because they enter that embattled house with frail motivation for mastering the arbitrary requirements of the primary grades, and a high expectancy of failure. But these children are motivated for some goals, and the teacher must graft a desire to read to the wishes that happen to be dominant. Motives, in the most general sense, are desired goals the child is uncertain of attaining. Many of the desirable things we seek are experiences we are not sure we can attain. During each successive stage in development, the profile of these uncertain delights changes, and so do the salient motives. The typical five-year-old is uncertain about his sex-role identity and whether he will be accepted and respected by extrafamilial adults. Hence he is motivated to acquire traits and skills that help define his masculinity (or femininity) and help him gain signs of acceptance from others. The teacher, and I use this term in its most general sense, should capitalize on these motives. The best structure for a young child in a learning situation is a one-to-one relationship with an adult. Such an arrangement is most likely to convince the child that the adult is aware of his existence and cares about his victories, joys, doubts, and fears. A one-to-one arrangement is most likely to persuade the five-year-old that intellectual skills are appropriate to his burgeoning identity and most likely to guarantee that his smallest victory will be praised. These experiences can thwart the temptation to withdraw, which continually shadows potential failure.

Since we do not have enough certified teachers to

meet the one-to-one requirement for every child we must use high school and college students, parents, and interested adults in the neighborhood as part of a nation-wide plan. This suggestion is practical, economical, and a reasonable derivative from theory. It is difficult to understand why we did not think of it earlier. The goal of the tutor, be he student, parent, or neither, is to persuade the child to involve himself in a cognitive activity so that he can produce evidence of the competence hidden within him.

If there is anything new to these ideas, it is the simple plea that we stop thinking of the disadvantaged child as having a deficit in words or numbers that has to be "made up," a mental cavity that has to be filled, as we feed a child deprived of protein or carbohydrate. A more appropriate image is the tempting of a shy deer out from behind a tree in order to try our menu, in the hope that it will come to prefer it to its usual diet. Persuasion, not enrichment, should be the essence of educational procedures. We must convince a great many young children that the attainment of the intellectual talents that our society happens to promote holds a potential for joy, since mastery of the competences valued by a culture can be one route to the self-actualization that everyone requires.

If we are successful, we will be able to use de Gourmont's (1953) criteria for documenting our victory, for he suggests that, "to judge how high a child's talent will reach do not attend so much to his greater and smaller facility for assimilating technical notions, but watch to see whether his eyes are occasionally clouded with tears of enthusiasm for the work."

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